
Overview

This standard identifies the competences you need to produce composite mouldings (such as moulds and components) using resin flow infusion techniques, in accordance with approved procedures. You will be required to use appropriate drawings, specifications and documentation to produce various mouldings, using the approved resin flow infusion production techniques.

You will produce a range of mouldings, incorporating a variety of features and using a range of techniques and processes. Mouldings produced will include laminates and sandwich structures, using a range of resin, fibre and core materials.

Your responsibilities will require you to comply with organisational policy and procedures for the production activities undertaken and to report any problems with the production activities, equipment or materials that you cannot personally resolve, or that are outside your permitted authority, to the relevant people. You will be expected to work to instructions under supervision, taking personal responsibility for your own actions and for the quality and accuracy of the work that you carry out.

Your underpinning knowledge will provide a good understanding of your work and will provide an informed approach to applying resin flow infusion techniques and procedures. You will understand the production techniques used and their application, in adequate depth to provide a sound basis for carrying out the activities and ensuring that the work output is to the required specification.

You will understand the safety precautions required when carrying out the moulding activities, and when using the associated tools and equipment. You will be required to demonstrate safe working practices throughout, and will understand the responsibility you owe to yourself and others in the workplace.

Performance criteria

You must be able to:

1. work safely at all times, complying with health and safety, environmental and other relevant regulations, directives and guidelines
2. follow the correct component drawing or any other related documentation for the component to be produced
3. confirm what has to be produced and how this will be achieved
4. carry out any preparation activities on the tooling, equipment and materials
5. carry out the moulding activities using the correct methods and techniques
6. produce mouldings to the required specification
7. deal promptly and effectively with problems within your control and report those that cannot be solved
8. complete relevant documentation
9. leave the work area in a safe and appropriate condition on completion of the activities

Knowledge and understanding

You need to know and understand:

1. the health and safety precautions to be taken, and procedures used, when working with composite materials, consumables, tools and equipment in the specific work area
2. the hazards associated with carrying out resin flow infusion techniques and with the composite materials, consumables, tools and equipment used and how to minimise these and reduce any risks in the work area
3. the protective equipment (PPE) that is needed for personal protection and where required, the protection of others
4. the application of COSHH regulations in relation to the storage, use and disposal of composite materials and consumables
5. the specific workshop environmental conditions that must be observed when producing composite mouldings using resin flow infusion techniques (such as temperature, humidity, styrene levels to threshold limits, fume/dust extraction systems and equipment)
6. how to identify and use information from engineering drawings and related specifications (to include symbols and conventions to appropriate BS, ISO or BSEN standards) in relation to work undertaken
7. how to interpret drawings/ lay-up manuals, systems of measurement, workpiece reference points and system of tolerancing
8. the quality procedures used in the workplace to ensure production control (in relation to currency, issue, meeting specification), and the completion of such documents
9. the basic conventions and terminology used for resin flow infusion techniques (such as material orientation, material identification, distribution media, resin viscosity, flow paths, ply lay-up, vacuum bagging, resin and fibre weights/volumes, gel times, exotherm, bleed plies)
10. the function of resins, reinforcement, catalysts, accelerators and additives play in the production of mouldings
11. the function of fibre materials, fabrics, orientations, their combinations play in the production of mouldings
12. the function of core and insert materials play in the production of mouldings
13. the function that resin distribution media play in the production of mouldings
14. how to visually identify raw and finished composite materials
15. how to identify materials by product codes
16. the type of production tooling used for producing composite mouldings

17. the identification of common defects in production tooling
18. how to build up laminates (including orientation and balance of plies), to minimise spring and distortion in composite mouldings
19. how to prepare patterns, moulds and tooling (including the correct selection and use of surface sealers and release agents)
20. the methods for handling, preparation and application of the reinforcing fibres and fabrics

21. the correct methods of storage and handling of ancillary and consumable materials

22. the methods used in the positioning and application of the resin distribution media

23. the importance of having the correct resin volume/weight required to saturate the reinforcing fibres
24. the importance of having the correct mixing ratios for gel coats, resins and catalysts, and the associated working times
25. the tools and equipment used in the resin flow infusion activities, and their care, preparation and safe handling
26. the importance of a vacuum check before the infusion starts
27. the common problems that can occur during the resin flow infusion process (including defects such as contamination, incomplete wet out, vacuum leaks, flow restrictions)
28. the methods and techniques used to cure composite mouldings including cure cycles and the need for monitoring
29. the procedures and methods used for removing mouldings from production tooling
30. the identification of common defects in the composite mouldings (such as de-lamination, voids, contaminants)
31. the care and safe handling of production tooling and composite mouldings throughout the production cycle
32. the extent of your own responsibility and to whom you should report if you have problems that you cannot resolve
33. the documentation to be completed during and/or on completion of the moulding activity

Scope/range related to performance criteria

1. Carry out all of the following during the moulding activities:
 1. use the appropriate documentation (such as job instructions, drawings, material data sheets, specifications, planning and quality control documentation)
 2. adhere to procedures or systems in place for risk assessment, COSHH, personal protective equipment and other relevant safety regulations and procedures to realise a safe system of work
 3. maintain a safe working environment for the moulding activities
 4. check that all tools and equipment to be used are correct for the operation to be carried out and are in a safe and usable condition
 5. follow safe practice/approved moulding techniques at all times
 6. return all tools and equipment to the correct location on completion of the moulding activities
 7. segregate and dispose of waste materials using the correct procedure

2. Carry out three of the following activities when preparing production tooling:
 1. check that tooling is correct and complete
 2. clean tooling and remove resin build-ups
 3. check for surface defects
 4. correctly apply sealers/release agents
 5. clean and store tooling suitably after use

3. Carry out three of the following activities to prepare materials for production:
 1. obtain the correct materials for the activity
 2. confirm materials are fit for purpose and in life
 3. cut materials to the correct size, shape and orientation
 4. confirm that the resin to fibre ratios is correct
 5. confirm the correct quantity of resin is available
 6. check the availability of required ancillary materials
 7. identify and protect materials in the work area
 8. check the correct infusion media and layout for the activity

4. Produce composite mouldings, using one of the following:
 1. test panel trials/tracking

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2. partial trial runs/tracking
 3. full scale trial runs/tracking
 4. production runs
 5. staged resin entry
 6. dry area rectification
 7. vacuum or resin flow regulation
 8. repairs
5. Produce composite mouldings incorporating three of the following in the lay-up:
1. butt joins
 2. overlap joins
 3. staggered joins
 4. feathered joins
 5. orientated plies
 6. inverted plies
 7. balancing plies
 8. inserts
 9. fixtures
 10. other (to be specified)
6. Produce composite mouldings incorporating four of the following shape features:
1. internal corners
 2. external corners
 3. horizontal surface
 4. vertical surface
 5. double curvature
 6. concave surface
 7. convex surfaces
 8. return surfaces
 9. joggle details
 10. nett edges
 11. other specific feature
7. Produce composite mouldings, using techniques for one type of resin from:
1. bio resin
 2. acrylic
 3. polyester
 4. vinyl ester
 5. epoxy
 6. phenolic
 7. other (to be specified)

8. Produce composite mouldings, using techniques for one type of fibre from:
 1. natural fibre
 2. thermoplastic
 3. glass
 4. aramid
 5. carbon
 6. hybrid
 7. other (to be specified)

9. Produce composite mouldings, using techniques for one type of reinforcement from:
 1. uni-directional
 2. chopped strand
 3. tissues/veils
 4. woven
 5. braids
 6. multi-axis/stitched
 7. knitted
 8. tapes
 9. other (to be specified)

10. Produce composite mouldings, using techniques for one type of core materials from:
 1. solid timber
 2. end grain balsa
 3. coremat
 4. rigid foam
 5. expanding foam
 6. skinned honeycomb
 7. other (to be specified)

11. Produce composite mouldings using techniques for four types of resin distribution media:
 1. mould surface entry
 2. interlaminar
 3. surface meshes
 4. infusion mats/fabrics
 5. channelled core
 6. perforated core
 7. perforated hose
 8. spiral wrap
 9. peel ply
 10. braid

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11. flow channels
 12. manifolds
 13. networks
 14. bleed plies
 15. moulded vacuum bags
12. Use four of the following vacuum bagging processes/methods:
1. check vacuum integrity
 2. surface bagging
 3. envelope bagging
 4. internal bagging
 5. pleats and tucks
 6. reusable bagging
 7. leak detection
 8. leak rectification

 9. catch pots/tanks

 10. localised resin injection

 11. use of reusable vacuum fittings
13. Produce composite mouldings in compliance with one of the following:
1. BS, ISO or BSEN standards and procedures
 2. customer standards and requirements
 3. company standards and procedures
 4. recognised compliance agency/body's standards
14. Complete the relevant documentation, to include one of the following:
1. production documentation
 2. quality control documentation
 3. job cards

Behaviours

You will be able to apply the appropriate behaviours required in the workplace to meet the job profile and overall company objectives, such as:

- strong work ethic
- positive attitude
- team player
- dependability
- responsibility
- honesty
- integrity
- motivation
- commitment

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